Healthcare associated Multidrug-resistant Organism (MRO) Surveillance

The MRO surveillance indicators are targeted at important antibiotic-resistant organisms that can spread amongst patients within hospitals and can cause invasive infections that are difficult to treat.

Case definition

Data are collected on the new acquisition of healthcare associated infection or colonisation due to one of the following targeted organisms:

**Vancomycin-resistant enterococci (VRE)**
*E. faecalis or E. faecium* reported resistant to vancomycin.

**Methicillin-resistant *Staphylococcus aureus* (MRSA)**
*Staphylococcus aureus* reported resistant to oxacillin or cefoxitin.

**Vancomycin-intermediate *Staphylococcus aureus* (VISA or hVISA)**
*Staphylococcus aureus* with reduced susceptibility to vancomycin.

**Vancomycin-resistant *Staphylococcus aureus* (VRSA)**
*Staphylococcus aureus* reported resistant to vancomycin.

**Extended spectrum beta-lactamase producers (ESBL)**
Gram-negative organism (e.g. *E. coli*, *Klebsiella* spp., *Enterobacter* spp.) in which a transmissible ESBL enzyme has been reported.

**Plasmid-mediated AmpC beta-lactamase producers (AMPC)**
Gram-negative organism in which laboratory detection of plasmid-mediated AmpC has been reported.

**Multidrug-resistant *Pseudomonas aeruginosa* (MRPAER)**
*P. aeruginosa* resistant to at least one antibiotic from 2 or more classes out of the following 3 groups:

- aminoglycosides (e.g. gentamicin, tobramycin)
- fluoroquinolones (e.g. ciprofloxacin, norfloxacin)
- beta-lactams (e.g. piperacillin, ticarcillin, ceftazidime, cefpirome, meropenem*)

**NOTES:**
*If resistance to meropenem is detected, record as CRPAER and if this resistance is detected via plasmid-mediated carbapenemase, record the type identified (e.g. MBL, OXA) under Resist “Other” details.

Exclude MRPAER isolates from cystic fibrosis patients and *Pseudomonas* species other than *P. aeruginosa*.

**Multidrug-resistant *Acinetobacter baumannii* (MRAB)**
*A. baumannii* resistant to at least one antibiotic from 2 or more classes out of the following 3 groups:

- aminoglycosides (e.g. gentamicin, tobramycin)
- fluoroquinolones (e.g. ciprofloxacin, norfloxacin)
- carbapenems (e.g. meropenem, imipenem, ertapenem)

**NOTES:**
*Acinetobacter* species are naturally resistant to the following beta-lactams: penicillins, cefazolin/cephalexin and ceftriaxone
*If resistance to meropenem is detected, record as CRAB and if this resistance is detected via plasmid-mediated carbapenemase, record the type identified (e.g. MBL, OXA) under Resist “Other” details.
Carbapenem-resistant Enterobacteriaceae and Acinetobacter species (CRGNB)

Enterobacteriaceae (e.g. E.coli, Enterobacter spp., Klebsiella spp., Proteus spp.) or Acinetobacter spp. reported as resistant to meropenem.

Record full identification (i.e. genus and species) and document the resistance mechanism under Resist “Other” details.

1. Plasmid mediated (carbapenemase enzymes):
   - *Klebsiella pneumoniae* carbapenemase (KPC)*
     - Gram-negative organism* in which laboratory detection of KPC has been reported
   - Metallo-beta-lactamase producers (MBL)
     - Gram-negative organism in which laboratory detection of MBL has been reported e.g. New Delhi MBL (NDM), Verona integron encoded MBL (VIM).
   - *Oxacillinase* (OXA)
     - Gram-negative organism in which laboratory detection of OXA has been reported

2. Non-plasmid mediated
   - If carbapenemase is not detected, record the resistance mechanism as “non-plasmid”

**NOTE:** Resistance to carbapenem may be due to either plasmid mediated enzymes (carbapenemase) or other mechanisms other than transmissible enzymes.

*Although K. pneumoniae remains the most prevalent organism carrying KPC, the enzyme has been identified in several other Gram-negative bacilli.*

### Episode / Case attributes

#### Acquisition Count
Total number of new healthcare associated MRO acquisitions for the surveillance period. Record separately for MRSA, VRE and all other MRO combined.

- Include all patients who became colonised or infected for the first time in your facility during the surveillance period, where the event was classified as healthcare associated (see below).
- Patients transferred to another facility and found to be positive for an MRO on admission are included in the discharging hospital’s statistics.

#### Infection (Morbidity) Count
Total number of new healthcare associated MRO infections for the surveillance period. Record separately for MRSA, VRE and all other MRO combined.

- Include patients who are known to be colonised and then develop a new healthcare associated infection with the same MRO.
- Count only one infection episode in the surveillance period for each patient.

**NOTE:** Ensure it is not an on-going infection recorded in a previous surveillance period

#### Definition of Infection
Isolates from specimens that are sterile (obtained by aseptic technique) are almost always considered significant, whereas isolates from non-sterile specimens cannot always be attributed to infection and may require clinical judgement to determine if an infection is present.

- A *sterile site infection* – blood culture, CSF, aspirate from a normally sterile body cavity (e.g. peritoneum, pleural or pericardial space) or a tissue sample collected by aseptic means (biopsy)
- A *non-sterile site infection* - wound swab, drain fluid, urine, sputum where the identified MRO was treated (including an intent to treat) with antibiotic therapy by a clinician.
Place of Acquisition

Healthcare associated
The episode is considered healthcare associated if the relevant specimen was collected:
> greater than 48 hours after admission/delivery at your facility and was not present or incubating on admission*, or
> within 48 hours of discharge/transfer, or
> the episode is epidemiologically linked to a previous admission/intervention at your facility (e.g. within one month of discharge and there is no evidence to link the isolate to another healthcare facility or intervention).

NOTES:
*Present or incubating on admission means there is documented clinical, radiological or laboratory evidence of related infection on admission and there is no evidence of a link to a medical procedure and/or prior admission. If there is any uncertainty, then the episode should be classified as an HAI.

If MRO identification was a direct result of an admission, intervention or procedure undertaken at another institution, the episode should be included in the statistics of the hospital responsible for the event (e.g. Patient had surgery at Hospital A and was discharged. Patient admitted to Hospital B with a MRO wound infection. Hospital B should advise Hospital A of the infection and the episode is included in Hospital A numbers.)

ICU Associated
(AICU=Adult, PICU=Paediatric, or NICU= Neonatal Intensive Care Units)
> The episode occurs > 48 hours after ICU admission, or
> within 48 hours of ICU discharge.

Burden
The MRO burden is defined as the number of patients with a MRO colonisation/infection that have been discharged from your facility during the surveillance period. Record individual counts for MRSA, VRE and all other MROs combined in the summary table of the surveillance reporting form (SRF).
> Include all infected or colonised patients on MRO precautions – new acquisitions and those admitted with a previously recorded history of MRO.
> Patients discharged, readmitted and discharged again during the surveillance period are counted twice.
> It is not necessary to have a positive culture during the admission.
> Exclude same-day patients.

NOTE:
Burden is recorded as a summary figure for reporting, patient details are not included in the table unless they also fulfil criteria for an acquisition or infection during the surveillance period.
Hierarchy of reporting

When a *new infection* is isolated from a sterile site (e.g. blood, CSF) and is also identified in a non-sterile site (e.g. wound, urine, sputum) during the same surveillance period, the sterile site episode takes precedence and is the reported event.

For example, the below records should be reported...

...as a single record as we only count one infection per surveillance period.

If the non-sterile site episode is either a colonisation and the collection date was prior to the sterile site episode, or the non-sterile site episode occurred in a previous surveillance period then it remains included in the numerator for the relevant surveillance period.

For example, the below case would be reported as two records.

QA NOTES:
If a MRO is isolated from a blood culture which has been classified as contaminant it should not be reported in the MRO or BSI surveillance data. Consideration should be given to screening the patient for MRO carriage.

Ensure each reported MRO bacteraemia has a corresponding episode documented in the BSI data for the relevant surveillance period.

Do not include details for on-going colonisation episodes from previously identified patients (i.e. Colonised / Infected = Colonised and New / Known = Known).

Resistance Codes

<table>
<thead>
<tr>
<th>CODE</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMPC</td>
<td>Plasmid-mediated AmpC beta-lactamase producer</td>
</tr>
<tr>
<td>CRAB</td>
<td>Multidrug-resistant <em>Acinetobacter baumannii</em> with meropenem resistance</td>
</tr>
<tr>
<td>CRGNB</td>
<td>Carbapenem resistant Enterobacteriaceae and <em>Acinetobacter</em> species</td>
</tr>
<tr>
<td>CRPAER</td>
<td>Multidrug-resistant <em>Pseudomonas aeruginosa</em> with meropenem resistance</td>
</tr>
<tr>
<td>ESBL</td>
<td>Extended spectrum beta-lactamase producer</td>
</tr>
<tr>
<td>MRAB</td>
<td>Multidrug-resistant <em>Acinetobacter baumannii</em></td>
</tr>
<tr>
<td>MRPAER</td>
<td>Multidrug-resistant <em>Pseudomonas aeruginosa</em></td>
</tr>
<tr>
<td>MRSA</td>
<td>Meticillin-resistant <em>Staphylococcus aureus</em></td>
</tr>
<tr>
<td>VISA/VRSA</td>
<td><em>Staphylococcus aureus</em> with reduced susceptibility or resistance to vancomycin</td>
</tr>
<tr>
<td>VRE Van A</td>
<td>Vancomycin-resistant enterococci Van A (<em>E. faecalis</em> or <em>E. faecium</em>)</td>
</tr>
<tr>
<td>VRE Van B</td>
<td>Vancomycin-resistant enterococci Van B (<em>E. faecalis</em> or <em>E. faecium</em>)</td>
</tr>
<tr>
<td>Other</td>
<td>For identification of new isolates of significance</td>
</tr>
</tbody>
</table>

For further information on infection definitions:
Data Element Table

The data specification table is intended to support standardised provision of MRO surveillance data by assisting with the application of definitions and identification of the minimum data requirements.

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>UR or Postcode</td>
<td>Unique record identification number</td>
<td>- This is the patient’s medical record number (MRN) or postcode for Private hospitals that do not supply MRN&lt;br&gt;- Mandatory field, cannot be null</td>
</tr>
<tr>
<td>Gender</td>
<td>Sex of the patient</td>
<td>- Mandatory field, cannot be null</td>
</tr>
<tr>
<td>Date of Birth</td>
<td>The patient's full year of birth, including day and month</td>
<td>- If date of birth is not known or cannot be provided, provision of a generic estimate is acceptable (the first day of the appropriate month or 01/01/ of the appropriate year)&lt;br&gt;- Format date as dd/mm/yyyy&lt;br&gt;- Mandatory field, cannot be null</td>
</tr>
<tr>
<td>Specimen Date</td>
<td>Identifies the date the specimen was taken</td>
<td>- Format date as dd/mm/yyyy&lt;br&gt;- Must be within the reporting month&lt;br&gt;- Mandatory field, cannot be null</td>
</tr>
<tr>
<td>ICU Status</td>
<td>Identifies if the specimen was taken in an Intensive Care Unit or a Non Intensive Care Unit i.e. ward</td>
<td>- Record as: AICU = Adult ICU&lt;br&gt;PICU = Paediatric ICU&lt;br&gt;NICU = Neonatal ICU&lt;br&gt;Non-ICU = for all other ward locations&lt;br&gt;- Mandatory field, cannot be null</td>
</tr>
<tr>
<td>LAB Name</td>
<td>Identifies the laboratory organisation that processed the specimen</td>
<td>- Mandatory field, cannot be null&lt;br&gt;- If unavailable record N/A</td>
</tr>
<tr>
<td>Specimen Number</td>
<td>Positive specimen’s unique identification number</td>
<td>- Identifier allocated by the laboratory to the pathology result&lt;br&gt;- Mandatory field, cannot be null&lt;br&gt;- If unavailable record N/A</td>
</tr>
<tr>
<td>Organism</td>
<td>Record organism associated with the antibiotic resistance</td>
<td>- For VRE, ensure species (faecium or faecalis) is recorded&lt;br&gt;- Mandatory field, cannot be null</td>
</tr>
<tr>
<td>Resistance Code</td>
<td>Record the code that identifies the type of resistance</td>
<td>- Record corresponding code from the “Resistance Codes” table.&lt;br&gt;- Mandatory field, cannot be null</td>
</tr>
<tr>
<td>Resistance Code &quot;Other&quot;</td>
<td>Initially used for identification of new isolates of significance</td>
<td>- For plasmid mediated CRGNB, CRPAER or CRAB record resistance mechanism (e.g. MBL, OXA)&lt;br&gt;- Mandatory if “Resistance Code” = Other or Resistance code = CRGNB, CRPAER or CRAB</td>
</tr>
<tr>
<td>Specimen Site</td>
<td>The site of the specimen (e.g. Blood, Urine, leg wound or screening etc.)</td>
<td>- “Screening” only applies to specimens specifically collected for identification of an MRO&lt;br&gt;- Mandatory field, cannot be null</td>
</tr>
<tr>
<td>Sterile / Non-sterile</td>
<td>Indicates whether the specimen was taken from a sterile or non-sterile site</td>
<td>- Record sterile status according to the rules set out under “Specimen classification”&lt;br&gt;- Mandatory field, cannot be null</td>
</tr>
<tr>
<td>Colonised / Infected</td>
<td>Indicates if the episode is an infection or colonisation</td>
<td>- Document infection status according to the rules set out under “Episode/Case attributes”&lt;br&gt;- Mandatory field, cannot be null&lt;br&gt;- Record as I or C</td>
</tr>
<tr>
<td>New / Known</td>
<td>Identifies whether the episode is a first isolation or an infection in a previously colonised patient</td>
<td>- Record acquisition status according to the rules set out under “Episode/Case attributes”&lt;br&gt;- Mandatory field, cannot be null</td>
</tr>
<tr>
<td>Comment</td>
<td>Record any other relevant information here</td>
<td>- Institution specific ward names are acceptable and are automatically assigned to ward groups on load to the database.</td>
</tr>
<tr>
<td>Acquisition Ward</td>
<td>Patient’s ward at time of acquisition</td>
<td>- Institution specific clinical names are acceptable and are automatically assigned to clinical unit groups on load to the database.</td>
</tr>
<tr>
<td>Acquisition Clinical Unit</td>
<td>Patient’s Clinical Unit at time of acquisition</td>
<td>- Institution specific clinical names are acceptable and are automatically assigned to clinical unit groups on load to the database.</td>
</tr>
</tbody>
</table>
Flow Chart

Multi-resistant organism identified from specimen?

Yes

Patient has been in hospital > 48 hrs and episode was not present or incubating on admission or is within 48hrs of discharge?

No

Yes

Episode is associated with a previous admission/intervention at your facility?

No

No

Case is associated with care at another facility?

Yes

Inform the other healthcare facility. Do not include in your SA Health surveillance data.

No

Do not include in your SA Health surveillance data.

Isolate is deemed to be causing clinical infection?

No

Yes

Patient has an active MRO history?

No

Yes

This episode fits the case definition and should be included in your SA Health surveillance data.

Record as: Colonised or Infected – Infected

New or Known = Known

This episode fits the case definition and should be included in your SA Health surveillance data.

Record as: Colonised or Infected – Infected

New or Known = New

For more information

Infection Control Service
Communicable Disease Control Branch
Telephone: 1300 232 272
www.sahealth.sa.gov.au/infectionprevention
Public-I1-A2
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# Multidrug-resistant Organism (MRO) Infection Surveillance

The following table provides a guide to the interpretation and recording of multidrug-resistant organisms/specimens for surveillance purposes only.

<table>
<thead>
<tr>
<th>SINGLE LAB RESULT DETAILS</th>
<th>CLASSIFICATION FOR ICS SURVEILLANCE – (column labels)</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organism</td>
<td>RESIST# Organism Resistance</td>
<td>“Other” resistance*</td>
</tr>
<tr>
<td>Org 1. <em>S. aureus</em></td>
<td>MRSA <em>S. aureus</em> VRE E. faecium</td>
<td>MRSA VRE E. faecium</td>
</tr>
<tr>
<td>Org 2. <em>E. faecium</em></td>
<td>NDM E. coli CRGNB NDM</td>
<td>NDM</td>
</tr>
<tr>
<td>Org 1. <em>E. coli</em></td>
<td>ESBL AmpC MBL CRGNB MBL</td>
<td>CRGNB MBL</td>
</tr>
<tr>
<td>Org 2. <em>K. pneumoniae</em></td>
<td>ESBL AmpC MBL CRGNB MBL</td>
<td>CRGNB MBL</td>
</tr>
</tbody>
</table>

### Org 1. *P. aeruginosa*

Lab result comment: “This organism produces a metallo-beta-lactamase or carbapenemase that inactivates all penicillins, cephalosporins and carbapenems”

| Amikacin Colistin Gentamicin Tobramycin Pip/Taz Ciproflox Cefazidime Meropenem Cefepime | P. aeruginosa CRPAER Plasmid mediated | This generic lab comment does not identify the resistance mechanism; exact details should be specified elsewhere on the lab report. If no other resistance mechanism is documented, record as “Plasmid-mediated” |
| Amikacin Colistin Gentamicin Tobramycin Pip/Taz Ciproflox Cefazidime Meropenem Cefepime | P. aeruginosa MRPAER | *P. aeruginosa* sensitive to meropenem should be recorded as MRPAER |

### Org 1. *A. baumannii*

“This organism produces a metallo-beta-lactamase (MBL) or other carbapenemase.

### Org 2. *K. pneumoniae*

“This organism produces a metallo-beta-lactamase (MBL) or other carbapenemase.

| KPC OXA-23 | A. baumannii CRAB | KPC | Different organisms Different resistance mechanisms Report as 2 records |
| KPC OXA-23 | A. baumannii CRAB | KPC | Different organisms Different resistance mechanisms Report as 2 records |

*Use the Resist “Other” details column on the surveillance reporting form to record resistance mechanisms.*